Review Article

EXAMINING VARIABLES EFFECTING HOUSING PRICES WITHIN THE SCOPE OF TRANSPORTATION INFRASTRUCTURE[*]

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Abstract

There are many factors that people pay attention while choosing housing. In addition to the physical characteristics of the housing; spatial features such as the distance of the housing to the city center, work and educational areas, public transportation stops also play an important role in the selection of housing. Although the distance of the housing to these places does not change, access will be much easier within the facilities provided by the existing transportation infrastructure. In parallel with urbanization and population growth, as a result of the increases in housing demand, there have been significant increases in housing prices. In this context, the aim of the study is to examine the variables affecting housing prices and to examine the connection between transportation and accessibility and housing prices. In this context, 30 studies were examined in which variables affecting housing prices were examined by different disciplines. As a result, it was seen that the distances to public transportation stops, the city center, the working and educational areas and the accessibility of housing have an increasing effect on housing prices.

Keywords: *Accessibility; Determinants of Housing Price; Factors Affecting Housing Price; Transportation*

Derleme Makale

KONUT FİYATLARINI ETKİLEYEN DEĞİŞKENLERİN
ULAŞIM ALTYAPISI KAPSAMINDA DEĞERLENDİRİLMESİ[*]

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Öz

İnsanların konut seçimi yaparken dikkat ettiği birçok faktör vardır. Konutun fiziksel özelliklerinin yanında; konutun kent merkezine, çalışma ve eğitim alanlarına, toplu taşıma duraklarına uzaklığı gibi mekânsal özellikleri de konut seçiminde önemli rol oynamaktadır. Konutun bu mekânlara olan mesafesi değişmese de mevcut ulaşım altyapısının sağladığı imkânlar dâhilinde erişim kolaylaşmaktadır. Kentleşme ve nüfus artışına paralel olarak konut talebinde yaşanan artışlar sonucunda konut fiyatlarında da önemli artışlar yaşanmıştır. Bu bağlamda çalışmanın amacı; konut fiyatlarını etkileyen değişkenleri incelemek, ulaşım ve erişilebilirlikle konut fiyatları arasındaki bağlantıyı irdelemektir. Bu kapsamda farklı disiplinler tarafından ortaya konmuş; konut fiyatlarını etkileyen değişkenlere ilişkin 30 çalışma incelenmiştir. İnceleme sonucunda toplu taşıma duraklarına, kent merkezine, çalışma ve eğitim alanlarına uzaklıkların, konutun erişilebilir olmasının konut fiyatları üzerinde artırıcı etkisi olduğu görülmüştür.

Anahtar Sözcükler: *Erişilebilirlik; Konut fiyatlarını belirleyen değişkenler; Konut fiyatlarını etkileyen faktörler; Ulaşım*

INTRODUCTION

In recent years, rapid population growth in cities has increased the need for new living spaces, which has led to growth in urban space. This spatial development has increased the need for housing and urban transport services. Especially in the recent period, transportation has become one of the most critical elements of urban life and has played a significant role in ensuring land use balance, supply-demand balance and urban economic balance. Also, transportation like sheltering or other vital activities, is essential in human lives because it links people between the places they want to travel, such as work, school, shops, hospitals, etc. (Khisty and Lall, 1990, p.9).

From the 1970s on, the meaning of the city and its role on the global level began to change. With the interaction of processes of globalization and localization, the transformation process in urban space is witnessed, as well as the positions and functions of the cities on the international level (Massey, 1993, p.7). With this change, housing has become a tool not only for people to meet their sheltering needs but also a way of life for people with its environment, public and social opportunities. The urban population growth, which started with the industrial revolution, was the last with the development of transportation technologies. With the developing transportation facilities, there are almost no areas in the cities that we cannot reach. With the increase in accessibility, both the population and demand for housing have increased (Karakurt Tosun and Fırat, 2012, p.174).

In addition to being a living space, housing is a necessary production product for the survival of individuals, a long and durable investment tool, and a place of economic quality that gives financial assurance for the future (Eceral and Uğurlar, 2014, p.33). That is why the decision-making process is considered as miscellaneous. The physical properties of the houses as well as their spatial properties, play a decisive role in their prices. Two houses with the same physical characteristics may have different prices in different locations (Topçu and Kubat, 2009, p.19).

With the population increase in the cities, the decrease in people's communication caused public spaces to lose their functions and identities. As public spaces lose their functions, people would like to stay at homes where they feel comfortable. So they start giving their homes more meaning (Sennett, 2013, p.176). The increase in the importance given to the houses caused an increase in the expectations of the individuals from the home. Thus, housing demand has increased, and housing has started to be shaped to meet these expectations (Alkan, 2014, p.105). The increase in population density and urbanization in cities bring about the growth of urban areas. With the urban growth, planning transportation to new residential areas and eliminating public needs in those areas are among the primary objectives. The demand for housing increases in line with the increasing population. This demand by local people also causes price increases in the housing market. Public projects, both in existing and new housing areas, lead to an increase in the area's economic value.

In order to balance the housing market in a city, environmental and social structure equality should be found between the neighborhoods. In addition, income level differences are reflected not only in the current situation of the house but also in the desired housing. Therefore, the general characteristics of houses and the changing socio-economic structure determine spatial preference to a large extent (Dökmeci and Berköz, 1994, p.199).

With the increasing population and the need for public transportation, there has been a significant increase in transportation projects since the 1970's. Transportation projects are considered as the major investments for the public interest. Especially in the last period, transportation has become one of the most important elements of urban life. Urban transport networks cause spatial and economic shaping around them because they make the places more accessible (Figure 1).
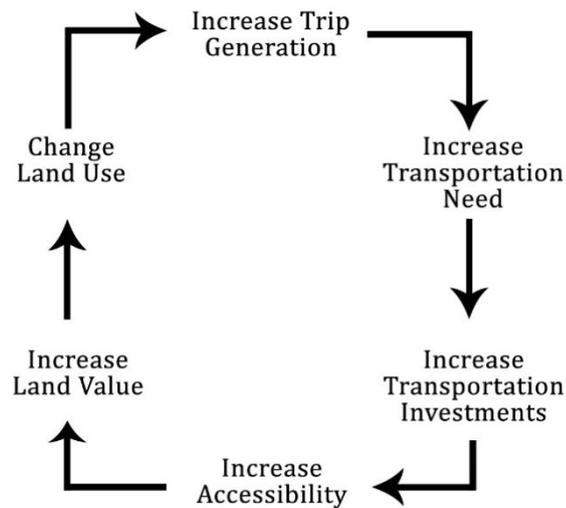
Figure 1. Land use and transportation cycle (**Reference:** Khisty, Jotin and Lall, 2003).

On the other hand, railway systems, with their permanent infrastructure systems, create highly accessible areas along their corridors. Babalik (2000, p.20) stated that this accessibility promotes intensive land use around the corridor and increases housing prices along the corridor. The transport and land use cycle set forth by Khisty and Lall also supports this belief. As seen in Figure 1, the number of trips and the need for transportation increases and this initiates the process of making transportation investments. These investments increase the accessibility of the place, and the land values increase with increasing accessibility. The increase in land values leads to changes in land use types in the space (Khisty and Lall, 1990, p.9).

Minikel, Simonson and Tia (2009) explain accessibility as a function of mobility, network, density, safety, security, comfort and integration. Moreover, they stated that more densely populated areas could support more services and amenities. A person who has a bicycle in a very dense area, such as one full of schools, hospitals, jobs and stores, can have accessibility equal to a car owner in a more dispersed area (Minikel, Simonson and Tian, 2009, p.59). Handy also defines accessibility as an ease for people to get to a destination. Furthermore, this is possible by developing a good-integrated transportation system between every part of the transportation modes. So, transportation networks have a vital balancing role in minimizing social inequalities and establishing social justice by making urban facilities more accessible (Handy 2005, p.137).

Social justice ensures a minimum life order for all individuals in a society (Çoban Kaynak, 2017, p.257). So, a transportation network with a strong connection between its links; has a key role in providing relations between facilities and residents, thereby establishing social justice in an urban area.

Çoban Kaynak (2017) stated criteria for ensuring social justice in welfare countries as prevention of poverty, ensuring equality of opportunity in education, participation in the labor market, organizing social security and social help, redistribution of welfare and income, fair distribution of resources and fair tax order.

Social justice can be the aim of an accessibility function because of the changing effect on housing prices, especially for urban planners. Housing prices are at the top of the determinants of the urban economy and housing prices are affected by many different variables. In the literature review, studies that examined many physical and environmental variables were evaluated. At this point, the relationship between transportation networks and housing prices play a big role in ensuring the balance of land use, supply-demand balance and urban economic balance. For this reason, the study focuses on determining transportation components affect the nearby neighborhood and housing prices.

In the research, the studies on the determinants of housing prices were examined. While the studies were examined, care was taken to analyze the information that would lead to the preparation of the land use sheet

and the determination of the survey variables for the subsequent studies. As a result, a summary table has been revealed, certain features of each study have been analyzed and reflected in the table. In the end, the determinants' relation with transportation is revealed from the table and interpreted.

Ayar and Çubukçu (2014) stated that the landscape around the housing has an increasing effect on the price. They asserted that this could be turned into an advantage for reserving areas for parks, recreational areas and green spaces. Modern solutions, such as a taxation system could be useful to achieve this goal (Ayar and Çubukçu, 2014, p.78). Similarly, a taxation system that takes account of accessibility can be discussed as an alternative to implement transportation decisions that cannot be realized in development plans due to a lack of resources.

METHOD

The increasing urban population increased the demand for housing and the expectations for the housing. Especially the differences in expectations have begun to create unfair places in the cities. The housing market has started to take shape as a sign of social status, so people from different income groups have started to choose different places in cities (Alkan, 2014, p.106). The city has become a place where spaces of spatial, social and physical injustices have emerged. This spatial differentiation reveals the necessity of establishing a balance of supply and demand by considering an integrated planning approach the housing market (Yirmibeşoğlu, 2008, p.128).

The housing market, which is one of the strongest indicators of the urban economy, has been shaped in connection with this spatial differentiation, and there have also been significant differences between housing prices. The fact that the housing groups, which appeal to different classes, have different characteristics is the main reason for evaluating housing as a heterogeneous property. Therefore, the service levels of houses differ (Eceral and Uğurlar, 2014, p.157). The injustice of both the physical and environmental groups of different housing groups is one of the main reasons for spatial segregation in cities. Failure to analyze the accessibility factors that determine housing prices and the inconsistency between plan decisions and accessibility cause spatial differentiation and unequal distribution of spatial planning decisions in the city. This injustice, spatial segregation and differentiation constitute the problem of this study.

ACCESSIBILITY, TRANSPORTATION AND HOUSING PRICES

This part of the study tries to put forward the subjects that focus on the factors affecting the housing prices. Literature reviews are very important for the determinants identified in the studies conducted so far, to provide insight into the fair use of space and its effects.

The studies show that the effect of many variables on house prices is investigated with different methods. However, most of the studies used variables to reveal the effect of the physical properties of the house on the price. Factors that can eliminate spatial disparities, such as the relationship with the environment, the presence of public areas in the vicinity and the level of satisfaction of the household, have not been adequately investigated. Table 1 summarizes the variables related to accessibility and transportation.

Table 1. Literature Review (**Reference:** Produced by the authors).

Author, Year	Profession	Place	Variables related with accessibility and transportation
Witte, Sumka and Erekson, 1979	Economics	Greenville, Kinston, Lexington, Statesville	Distance to CBD
Li and Brown, 1980	Economics	Boston	Distance to Boston, ocean, rivers, schools, industrial area, highway
Türel, 1981	Planning	Ankara	Distance to CBD
Mok, Chan and Cho, 1995	Economics	Hong Kong	Distance to CBD and schools
Üçdoğruk, 2001	Economics	İzmir	Location (on the main street or not)
Yankaya and Çelik, 2005	Planning and Engineering	İzmir	Walking distance to public transport stops
Özus and Dökmeci, 2006	Planning	İstanbul	Distance to industrial area
Karagöl, 2007	Planning	Ankara	Location (on the main street or not)
Yahşi and Dökmeci, 2007	Planning	İstanbul	Accessibility to public transport, distance to schools
Zietz, Zietz and Sirmans, 2007	Economics and Business	Utah	Distance to CBD and highway
Cohen and Coughlin, 2008	Economics	Atlanta	Distance to airport
Selim, 2008	Business	Turkey	Location (urban or rural / accessibility)
Ünlükara and Dökmeci, 2008	Planning	İstanbul	Distance to CBD
Abayhan, 2009	Planning	İzmir	Walking distance to subcenter and lake
Cingöz, 2010	Economics	İstanbul	Distance to CBD
Ekşioğlu Çetintahra and Çubukçu, 2011	Planning	İzmir	-
Zhang, Hua and Zhao, 2012	Business	China	-
Wen, Bu and Zhang, 2013	Engineering	Hangzhou	Distance to markets, banks, hospitals, schools, university and social facilities
Ecer, 2014	Economics	İzmir	Location (on the main street or not), accessibility to public transport
Kördiş, Işık and Mert, 2014	Economics	Antalya	Distance to sea
Yayar and Gül, 2014	Economics	Mersin	Distance to markets, parks, sea, CBD and public transport
Yayar and Demir, 2014	Economics	Turkey	Accessibility level to banks, health and educational services
Yayar and Karaca, 2014	Economics and Business	TR83 Region	Location (street, road or boulevard), distance to CBD
Bulut, Öner and İslamoğlu, 2015	Economics	Samsun	Distance to public transport
Çiçek and Hatırlı, 2015	Economics	Isparta	Accessibility to parks, health, educational and municipal services and markets
Işık, 2015	Economics	Erzurum	Distance to CBD and pulic areas
Kim, Park, Lee and Xue, 2015	Economics and Business	Seoul	Accessibility to public transport and schools
Kangallı Uyar and Yayla, 2016	Economics	İstanbul	-
Afşar, Yılmazel and Yılmazel, 2017	Economics and Engineering	Eskişehir	-

When looking at the table, most of the researchers tried to find a relation between housing prices and distances and accessibility to important areas. Only 4 of the studies had no variable related to neither accessibility nor transportation. In order to understand the approaches of different disciplines about the subject, the profession of the writers was also examined. It can be clearly seen that many researchers from different disciplines are interested in this subject, such as; economics, planning, engineering and business. The most evaluated variable in the studies could be the distance to CBD and important public uses.

On the other hand, many variables are also considered when examining the housing price determinants. In the study by Li and Brown in Boston, the landscape quality of the housing was found as the most important variable increasing; noise pollution was found as the most important variable decreasing the price. Mok, Chan and Cho conducted a study examining 1027 houses and found a strong relation between prices and the age of building and distance to city center. As the distance decreases (accessibility increases), house prices increase. In the study by Üçdoğruk the relation between the location (district) of the houses and the price was investigated and it was found that there were significant differences between the housing prices of different districts. Yankaya and Çelik conducted another important study about accessibility and housing prices. The authors investigated the effect of the rail system on housing prices and found that the walking distance to metro stops was a decreasing effect on prices. The importance sea view was revealed by Özüs and Dökmeci in 2006 and the importance of view was revealed by Abayhan in 2009. The studies by Karagöl and Yahşi and Dökmeci in 2007 were mostly based on the relationship between physical characteristics and price. In both studies the number of rooms was found as the most determinative factor on housing prices. Zietz and Sirmans in their study found that the size of the house and the land and the number of bathrooms were the increasing effect on prices. In their study in Atlanta, Cohen and Coughlin investigated the effect of noise pollution on housing prices, so they identified a study area around the airport. As a result, they found the cheapest houses in the periphery of the airport. Cingöz conducted a study to reveal the relation between gated communities and their prices accordingly and found that the most significant factor is the location of the gated community. Ekşioğlu Çetintahra and Çubukçu found a strong relationship between the prices and environmental aesthetic in 2011, İzmir. Another important study conducted by Zhang, Hua and Zhao in China attempted to determine how house prices are affected by economic variables. They found that the most important factors affecting housing prices were the mortgage rate, producer price index and exchange rate. In another study by Ecer in İzmir, the transportation facilities and their relation with housing prices were investigated. The author found a significant relationship between them. Yayar and Gül claimed that the accessibility to social areas was an important indicator on housing prices in Mersin. Yayar and Demir investigated the accessibility to public, social and needed areas were increasing effect on housing prices. Another important study about transportation and housing prices was conducted by Bulut, Öner and İslamoğlu in 2015, Samsun. The accessibility to public transportation stops increased house prices. In the study by Çiçek and Hatırlı air pollution, distance to the city center and the age of the building were found as price-decreasing factors. Similarly, Işık found that distance to city center was a price-decreasing factor in Erzurum too. Similar to Özüs and Dökmeci (2006) and Abayhan (2009), Kangallı Uyar and Yayla was found that the existence of a view had an increasing effect on house prices. Topçu and Kubat also investigated the relationship between distance to the city center and house prices and found a significant relationship between them.

It is seen that the planning discipline deals with the issue more holistically. It examines the interactions of prices with environmental factors, the quality of the environment and physical and social infrastructure and their fair distribution besides the accessibility and transportation. (Türel, 1981, Yankaya and Çelik, 2005, Özus and Dökmeci, 2006, Karagöl, 2007, Yahşi and Dökmeci, 2007, Ünlükara and Dökmeci, 2008, Abayhan, 2009, Ekşioğlu Çetintahra and Çubukçu, 2011).

On the other hand, researchers from economics discipline mostly examined the physical properties of the housings. But also, the financial data that might affect housing prices included the variables such as; mortgage rates, consumer and producer price indexes, land and rent indexes, personal disposable income and real GDP (Witte, Sumka and Erekson, 1979, Li and Brown, 1980, Mok, Chan and Cho, 1995, Üçdoğruk, 2001, Yayar and Gül, 2014, Bulut, Öner and İslamoğlu, 2015, Kim, Park, Lee and Xue, 2015).

Moreover,the studies conducted by engineers were mostly based on the physical characteristics of the housings and their relation with the price (Yankaya and Çelik, 2005, Wen, Bu and Zhang, 2013, Afşar, Yılmazel and Yılmazel, 2017).

Topçu and Kubat (2009) examined the relationship between spatial structure and land values. The tool for measurement is based on the streets and their distances to urban facilities. The evaluation results were show that the distance to the sea and the distance to the city center were determined to be the most significant variables on land prices. Another important and deterministic variable of the study is spatial quality. It was determined that the land prices were significantly higher in the streets with harmonious structures. Also, the lands on the streets had points of views that were higher in prices. The street's lighting, long visibility, security and mobility (mixed-use) were also increasing effect on land prices. With its spatial, morphological and space quality variables, the study was distinguished from other research and made an important contribution to the literature.

CONCLUSION

Especially in recent years, housing has become a tool for individuals to meet their housing needs, as well as to define a person's lifestyle, social status in which they belong or want to be. Therefore, when choosing housing, individuals started to think about their surroundings as a whole and look for regions according to their income groups. The segregation between income groups has brought about spatial divergence, which is one of the biggest problems of today's cities. Large differences were observed in spatial and economic terms between differentiated residential areas. Especially in big cities, more investments are made in the regions in which high-income groups live and this makes the areas of low-income individuals disadvantaged.

In general, the choice of individuals from upper and middle-income groups is higher than the lower-income group and the individuals from the lower-income group are more limited in economic choice. As income increases, freedom of choice increases. This means that individuals from lower-income groups are required to select spatially disadvantaged regions.

Accessibility to the working and social service areas is vital for the equal distribution of urban rights. If necessary, to evaluate the literature, specific determinants of transportation and accessibility have been highlighted by researchers.

As stated in most of the studies, distance to the city center strongly relates to housing prices. Distance to the sea and the city center are the most significant variables in the context of land and housing prices. If necessary, to examine distance to the city center variable relation with housing prices, city center is the best place to access social service areas and working areas with minimum travel cost and travel time. Even if a person who does not have public transportation alternatives or sufficient economic power can reach every social service area, such as health or education service or working areas on foot.

In addition; high-income areas were produced in certain regions of the cities, and it could not provide housing to people from other income groups in these areas.

In some case, the block effect of high-income group's housing areas can be a disadvantage for people trying to access social service areas or working areas, because of the barrier effect of gated communities or the lack of public transportation services. Also, there are studies focusing on the distance to the public transportation stops. While the walking distance to the subway station decreases housing prices; the walking distance to bus stops does not have a significant effect in some cases.

As a result, accessibility has a strong effect on housing prices because of its balancing role on the production of more accessible social services and working areas and has a role in making cities fairer. It has been seen in the detailed literature review that the factors affecting housing prices are mostly evaluated independently from their surroundings. Even if the distances to public, recreational and commercial areas and the distances to public transport stops are examined in some studies, there are almost no studies evaluating the quality of these areas, the access difficulties of individuals or their expectations from the environment. The fact that

these surveys are carried out, especially in the regions where spatial segregation is visible, is highly determinative for explaining the factors affecting housing prices.

Although it is thought that examining the factors affecting the housing prices with the environment will determine the economic power of the region, it is also very important for forming a fair city from a spatial point of view. With the increasing population, the cities are expanding, and the lower-income group, whose freedom of choice is very low, goes to meet its housing needs. This causes inadequate areas from all kinds of infrastructure. On the other hand, housing for the lower-income group remains a need for housing.

While investigating the factors affecting housing prices, it is very important to interview individuals from each income group in order to remove the differences between the regions. In order to ensure equality of opportunity, the housing options for each income group in the regions, where equal services are accommodated, are vital for fair distribution of space. And public transportation service is the strongest tool for balancing opportunities for everyone.

It is also stated that urban green areas add aesthetic value to the landscape of residential areas and thus bring additional value to the housing price. Likewise, if accessibility brings additional value to housing prices, it may be controversial that nationalization of transport infrastructure areas and the construction and maintenance costs are covered by taxing the surplus value of the housing price. The rising monetary effect of being close to some transportation components such as train stops, tram stops, bus stations, transfer stations etc. as being an accessibility index; can discuss one of the taxation tool on future studies as being a tool for equalization of social justice.

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